



**POSSIBILITIES OF SONOELASTOGRAPHY
IN THE EVALUATION OF THE LOWER THIRD
OF FACE SOFT TISSUES CHANGES
DETERMINING THE MOST EFFECTIVE
METHOD OF CORRECTION**

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INTRODUCTION

- The demand for plastic surgery is growing more and more every year, which is most often associated with a loss of physical attractiveness due to age-related changes in the body or for aesthetic reasons. Though, the main method for assessing the state of the patient's muscle tissue is still a visual assessment by a plastic surgeon.
- This study discusses the use of shear wave elastography in evaluation of age-related atrophic processes in muscle tissue in the lower third of face in women of different age.



In recent decades, sonoelastography has been actively used to study soft tissues and their structural changes. However, the use of elastography in plastic surgery and cosmetology, in contrast to traditional methods of ultrasound diagnostics, is a rarer phenomenon. To date, there are only seven studies in the literature on the use of sonoelastography in soft tissue assessment in plastic surgery and cosmetology. Only 5 of them are devoted to the assessment of changes in the soft tissues of the face.

- Paluch L., Ambroziak M., Pietruski P., Noszczyk B. Shear Wave Elastography in the Evaluation of Facial Skin Stiffness After Focused Ultrasound Treatment. *Dermatol Surg.* 2019 Dec; 45(12): 1620-1626. DOI: [10.1097/DSS.0000000000001881](https://doi.org/10.1097/DSS.0000000000001881)
- Ambroziak M., Noszczyk B., Pietruski P., Guz W., Paluch Ł. Elastography reference values of facial skin elasticity. *Postepy Dermatol Alergol.* 2019 Oct; 36(5): 626-634. DOI: [10.5114/ada.2018.77502](https://doi.org/10.5114/ada.2018.77502)
- Alfuraih A.M., Tan A.L., O'Connor P., Emery P., Wakefield R.J. The effect of ageing on shear wave elastography muscle stiffness in adults. *Aging Clin Exp Res.* 2019 Dec; 31(12): 1755-1763. DOI: [10.1007/s40520-019-01139-0](https://doi.org/10.1007/s40520-019-01139-0)
- Paluch Ł., Pietruski P., Kwiek B., Noszczyk B., Ambroziak M. Age-related changes in elastographically determined strain of the facial fat compartments: a new frontier of research on face aging processes. *Postepy Dermatol Alergol.* 2020 Jun; 37(3): 353-359. DOI: [10.5114/ada.2018.79778](https://doi.org/10.5114/ada.2018.79778)
- Paluch Ł., Pietruski P., Noszczyk B., Kwiek B., Ambroziak M. Intra-rater reproducibility of shear wave elastography in the evaluation of facial skin. *Postepy Dermatol Alergol.* 2020 Jun; 37(3): 371-376. DOI: [10.5114/ada.2018.81144](https://doi.org/10.5114/ada.2018.81144)
- An analysis of all these sources allows us to conclude that, due to the small number of patients in the study groups, the narrowness of the goal, etc. at the moment, the topic of the use of elastography in diagnostics in the field of plastic surgery and restorative medicine is currently insufficiently studied.

OBJECTIVE

- Main aim of the study is to explore the possibility of using sonoelastography in the study of age-related changes in elasticity of muscle tissue of the lower third of the face in women, correlating with atrophic processes.

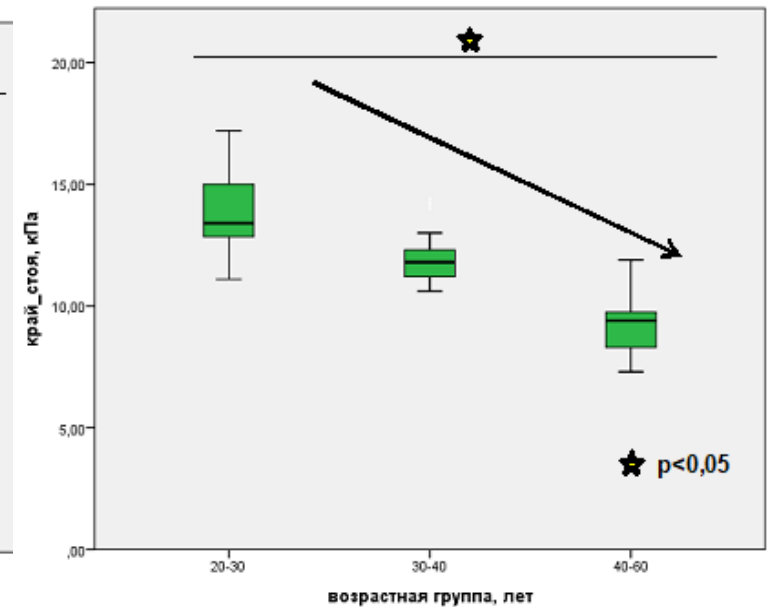
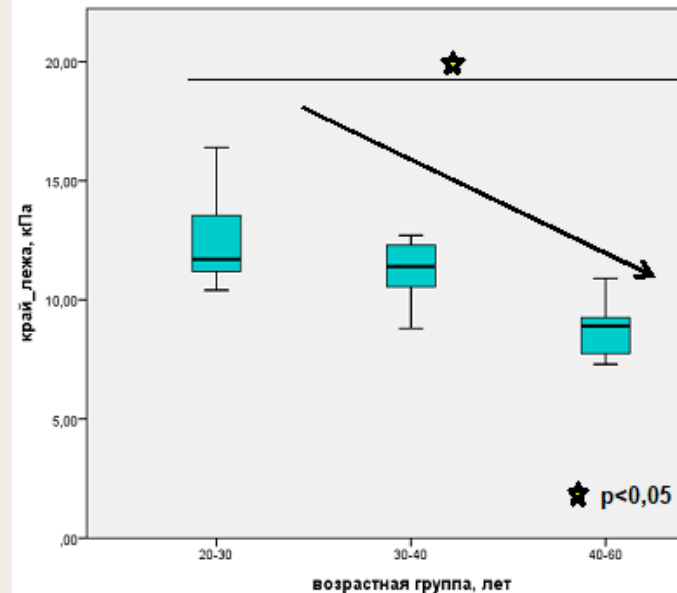
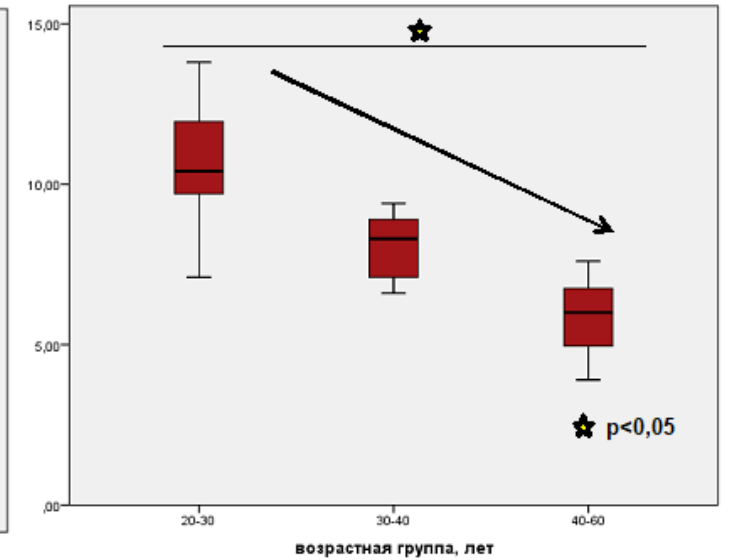
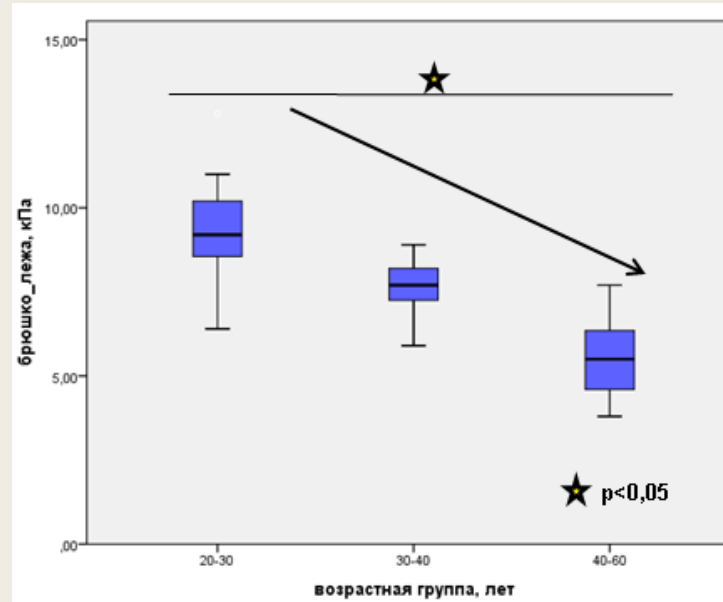


MATERIALS AND METHODS

- 45 women divided into three equal groups by age (20-30, 30-40 and 40-60 years old) were involved in the study.
- The division into groups is necessary to estimate the differences in the parameters of elasticity depending on age.
- Elasticity of muscle tissue in the area of buccinator muscle was assessed using shear wave elastography with linear probe. The assessment was carried out in two positions: vertical and horizontal to assess the effect of gravity on muscles stiffness.
- The results were statistically processed and evaluated in terms of practical application.

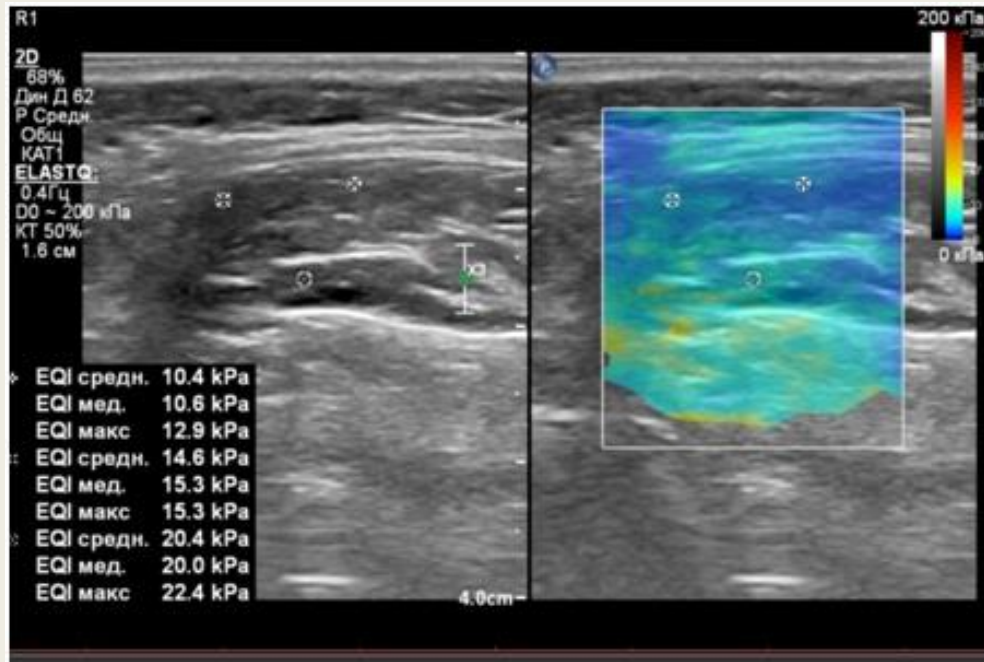
RESULTS

- There was a statistically significant decrease in the elasticity of muscle tissue in the lower third of the face, associated with the processes of age-related atrophy (the average value of the stiffness of the muscle in vertical position:
GROUP 1 - 10.58 ± 1.78 kPa,
GROUP 2 - 8.09 ± 1 kPa,
GROUP 3 - 5.8 ± 1.24 kPa).

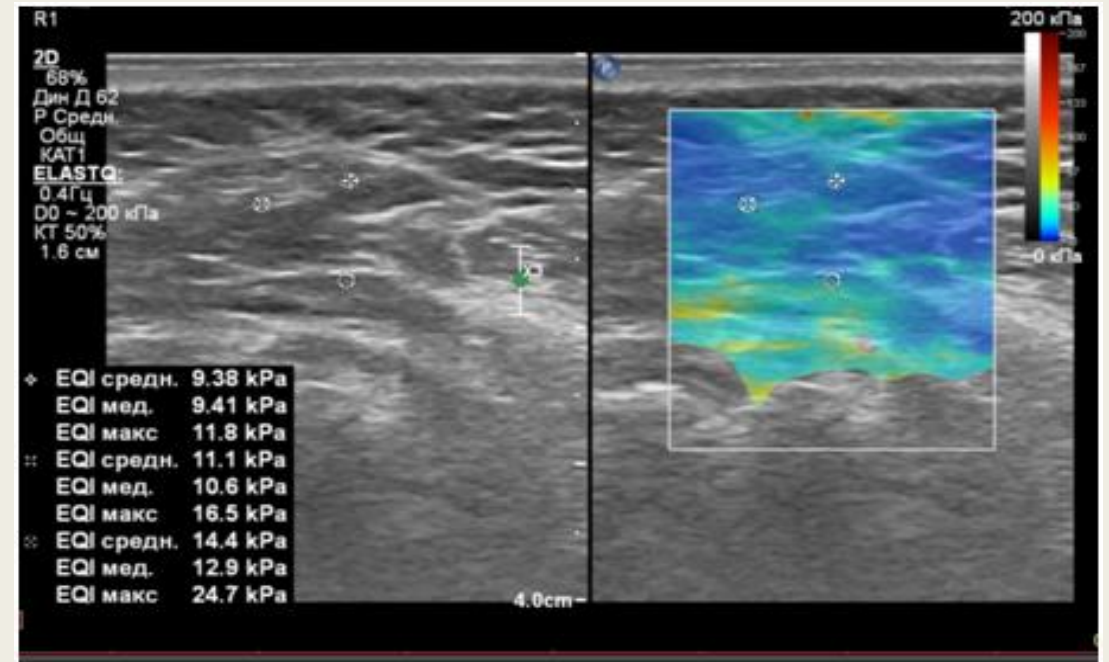


RESULTS

Ultrasound images of the buccal muscle of the patient of **GROUP 1** in sonoelastography mode



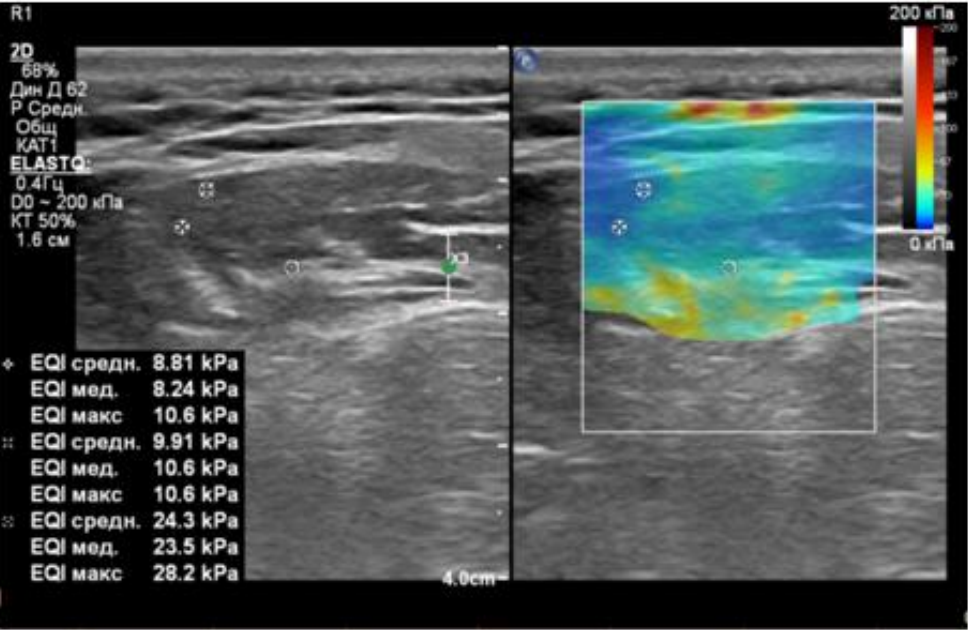
in the standing position



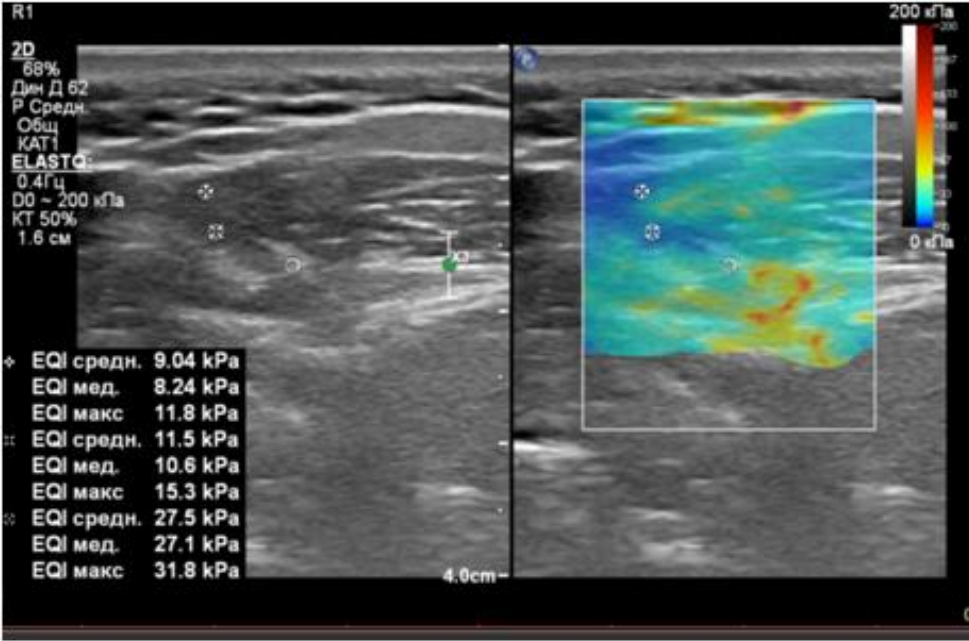
in the supine position

RESULTS

Ultrasound images of the buccal muscle of the patient of **GROUP 2** in sonoelastography mode



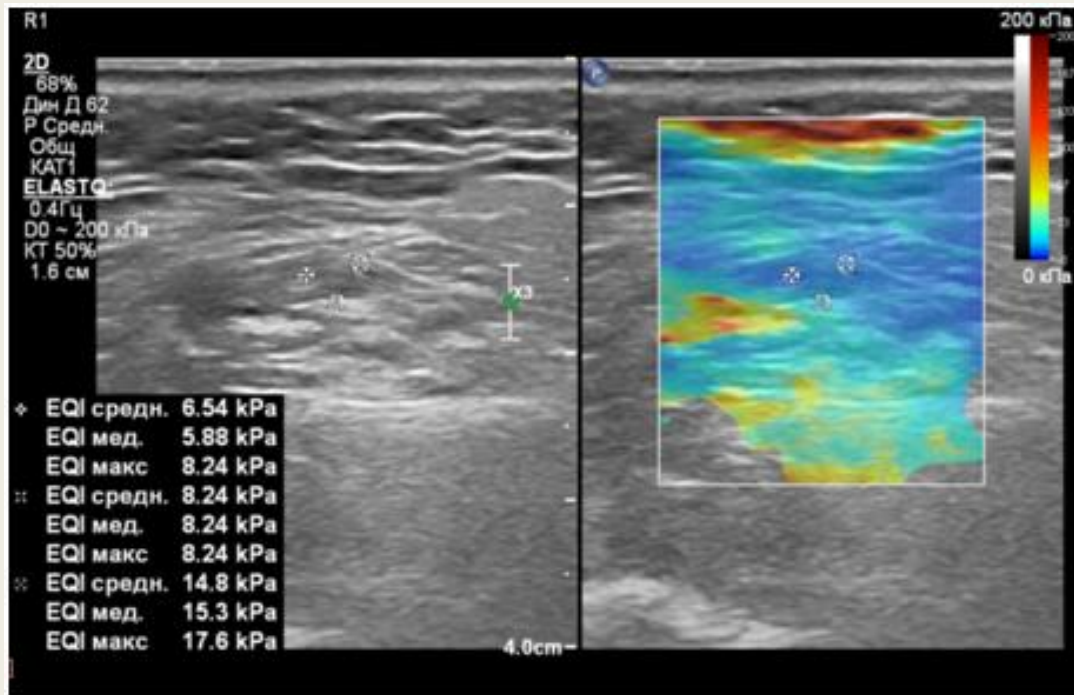
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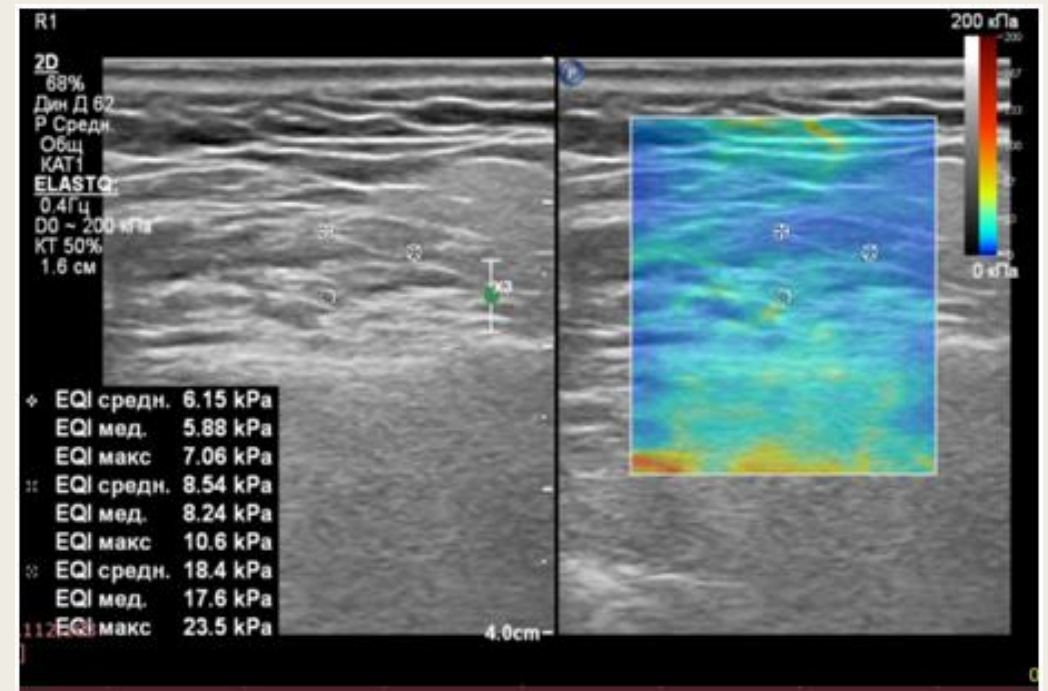
in the supine position

RESULTS

Ultrasound images of the buccal muscle of the patient of **GROUP 3** in sonoelastography mode



in the standing position



in the supine position

RESULTS

- There were almost no differences in elasticity while changing the position from vertical to horizontal in the older age group (GROUP 3). It is associated with progressive age-related changes in the tissues and is clearly displayed by ultrasound examination (stiffness of the muscle in GROUP 3 in vertical position - 5.8 ± 1.24 kPa, in horizontal - 5.44 ± 1.21 kPa).

CONCLUSION

- Using sonoelastography it is possible to display atrophic processes in facial muscle tissue. It may be helpful in the future in preoperative diagnosis and choosing the optimal method of correction.
- Sonoelastography is a promising method for assessing age-related changes in soft tissues in plastic surgery, aesthetic medicine and cosmetology. Further studies for the application of this method are required and may lead to its implementation in routine practice in this field of medicine.